

TASKS	HAZARDS	CONTROLS
General ROV Development		
Using heavy machinery and power tools	Hearing damage	- Wear earmuffs to prevent noise-induced hearing loss
	Eye injury	- Wear safety goggles to prevent flying debris from causing eye injury
	Flesh wound	- Ensure the machinery/tool is in good condition before use - Keep a safe distance from moving blades or drill bits - Touch heavy machineries if and only if they are completely stopped - Turn off the machines when not in use
	Burns	- Do not touch the cut pieces immediately after cutting or drilling - Wear protective gloves when touching hot metal pieces
	Respiratory irritation and damage	- Wear particulate respirators to filter out airborne particulate matter
Making buoyancy foam	Irritation	- Wear protective gloves when working with epoxy
	Burns	- Turn off the foam cutter when not in use - Wear protective gloves when handling the cutter
	Respiratory irritation and damage	- Wear particulate respirators - Perform sanding under a fume hood
Soldering circuit board and other electronic components	Fire hazard	- Turn off soldering iron when not in use - Do not leave hot iron unattended - Remove combustible materials from work area
	Skin burnt	- Place soldering iron on its holder after each use
	Chemical inhalation	- Perform work under a fume hood or in a well-ventilated area
Waterproofing electronic components	Irritation	- Wear protective gloves when touching epoxy
	Chemical inhalation	- Perform work under a fume hood or in a well-ventilated area

Operations		
Transporting the ROV	Foot injury	<ul style="list-style-type: none"> - Wear close-toed shoes when pushing transportation cart - Secure all loose and moving parts on the transportation cart with cable ties
	Impact with the transportation cart	<ul style="list-style-type: none"> - Do not walk in front of the transportation cart - Keep transported objects inside the cart
Loading or unloading the ROV system into or from the transportation cart	Back injury	<ul style="list-style-type: none"> - Picking up heavy equipment with a neutral lower back to prevent spinal disc injury - Carry heavy objects according to one's limits - Lift heavy objects together - Do not lift anything above the shoulder level
	Hand injury	<ul style="list-style-type: none"> - Make sure all handles are strong and safe - Ensure no sharp objects around handles
	Foot injury	<ul style="list-style-type: none"> - Wear close-toed shoes
	Slipping	<ul style="list-style-type: none"> - Wear non-slip shoes near the pool - Do not run near the pool
Setting up power supply	Overvoltage	<ul style="list-style-type: none"> - Check the voltage reading that it shows nominal 48V
Setting up air pump	Over-pressurized	<ul style="list-style-type: none"> - Set pressure regulator to 275kPa - Ensure no air leaks in the pneumatics fittings - Depressurize the compressor tank after every use
Setting up the tether	Loose tether	<ul style="list-style-type: none"> - Secure the tether with carabiner strain reliefs on the ROV side and the control box side.
	Tangled tether	<ul style="list-style-type: none"> - Stow the tether into the tether cart roll after every use
Managing the tether	Tether damage	<ul style="list-style-type: none"> - Supply enough tether to ROV to prevent excessive tension on the tether - Hold the tether up to prevent friction with pool edge
	Tripping over tether	<ul style="list-style-type: none"> - Make sure the tether is neatly laid on the floor
Checking buoyancy	Water leakage	<ul style="list-style-type: none"> - Check all connections before putting ROV in water

Job Safety Analysis

	Back, shoulders and forearm strain	<ul style="list-style-type: none"> - Carry ROV with at least two people - Keep a neutral lower back when picking up ROV from the pool
Dry running the ROV	Damaging the frame or manipulators	<ul style="list-style-type: none"> - Put ROV on the stand to prevent any physical damage
	Flesh wound	<ul style="list-style-type: none"> - Put warning labels on thrusters and sharp edges - Yell "Contact" when someone needs to touch the ROV, signalling the pilot to put down the controller - Keep hands at a safe distance when thrusters are turning
Product Demonstration	Thruster malfunction	<ul style="list-style-type: none"> - Ensure that someone is on standby to push the emergency kill switch
Deploying and retrieving ROV	Back, shoulders and forearm strain	<ul style="list-style-type: none"> - Carry ROV with at least two people - Maintain a neutral lower back when picking up ROV from the pool - Avoid twisting motions when retrieving ROV - Do not reach too far into the water
	Flesh wound	<ul style="list-style-type: none"> - Yell "Contact" when someone needs to touch the ROV, signalling the pilot to put down the controller - Keep hands at a safe distance while thrusters are turning
	Electrocution	<ul style="list-style-type: none"> - Keep electronic components away from the pool, and protect them from splashes - Check and secure all connections - Ensure no exposed and loose wire - Kill power immediately when there is an indication of electrical problems

Required Training	Required Personal Protective Equipment
<ol style="list-style-type: none"> 1. Use of heavy machinery and tools 2. Loading and unloading equipment 3. Setting up power supply and air pump 4. Dry running the ROV on deck 5. Launching the ROV 	<ol style="list-style-type: none"> 1. Close-toed shoes 2. Gas masks and respirators 3. Protective gloves 4. Noise-blocking earmuffs 5. Protective goggles